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# Loss of employment and mortality

Joan K Morris, Derek G Cook, A Gerald Shaper

**Abstract**

***Objective*—To assess effect of unemployment and early retirement on mortality in a group of middle aged British men.**

***Design*—Prospective cohort study (British Regional Heart Study). Five years after initial screening, information on employment experience was obtained with a postal questionnaire.**

***Setting*—One general practice in each of 24 towns in Britain.**

***Subjects*—6191 men aged 40-59 who had been continuously employed for at least five years before initial screening in 1978-80: 1779 experienced some unemployment or retired during the five years after screening, and 4412 remained continuously employed.**

***Main outcome measure*—Mortality during 5·5 years after postal questionnaire.**

***Results*—Men who experienced unemployment in the five years after initial screening were twice as likely to die during the following 5·5 years as men who remained continuously employed (relative risk 2·13 (95% confidence interval 1·71 to 2·65). After adjustment for socioeconomic variables (town and social class), health related behaviour (smoking, alcohol consumption, and body weight), and health indicators (recall of doctor diagnoses) that had been assessed at initial screening the relative risk was slightly reduced, to 1·95 (1·57 to 2·43). Even men who retired early for reasons other than illness and who appeared to be relatively advantaged and healthy had a significantly increased risk of mortality compared with men who remained continuously employed (relative risk 1·87 (1·35 to 2·60)). The increased risk of mortality from cancer was similar to that of mortality from cardiovascular disease (adjusted relative risk 2·07 and 2·13 respectively).**

***Conclusions*—In this group of stably employed middle aged men loss of employment was associated with an increased risk of mortality even after adjustment for background variables, suggesting a causal effect. The effect was non-specific, however, with the increased mortality involving both cancer and cardiovascular disease.**

**Department of Public Health, Royal Free Hospital School of Medicine, London NW3 2PF**
Joan K Morris, *lecturer in medical statistics*
A Gerald Shaper, *professor of clinical epidemiology*

**Department of Public Health Sciences, St George's Hospital Medical School, London SW17 0RE**
Derek G Cook, *senior lecturer in epidemiology*

Correspondence to:
Dr Cook.

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## Introduction

Many studies have shown that unemployed men are less healthy and have a higher mortality than employed men.[1-10] It has been suggested that this might be explained by a health selection effect into unemployment, with less healthy workers being more likely to lose their jobs and finding it harder to regain employment.[11-14] However, because of small sample sizes or a lack of health measures before the loss of employment, the reported studies have been limited in their ability to investigate the extent to which health selection explains the raised mortality in unemployed men.

We used prospective data from a national study of cardiovascular disease to examine mortality in a population of stably employed middle aged men in Britain, some of whom subsequently experienced a loss of employment. Measures of health and health related behaviour made before the loss of employment enabled us to allow for the effect of health selection and to determine the possible effects of loss of employment on apparently healthy men.

## Subjects and methods

In 1978-80 men aged 40-59 were randomly selected from one general practice in each of 24 towns in England, Wales, and Scotland to form the study population of the British Regional Heart Study. The criteria for selecting the towns and general practices and the methods of data collection have been reported.[15] Research nurses administered a standard questionnaire that included questions on occupational history, employment status, and medical history.

After five years (1983-5) we sent a postal questionnaire to all surviving men still resident in the United Kingdom and obtained detailed information from 7275 (98%) of these men on their employment status during the five years before screening and the five years between screening and the postal questionnaire. The employment status of 29 men could not be determined because of incomplete data, leaving 7246 for analysis. In order to investigate the effect of loss of employment on subsequent mortality we excluded all men who were not employed at the initial screening or who had experienced any unemployment in the previous five years. This left 6191 men in the study.

### EMPLOYMENT GROUPS

The men were classified according to whether they had experienced any loss of employment during the five years between initial screening and the postal questionnaire. More detailed analyses were carried out by classifying men by their own assessment of their employment experience over these five years and their reason for loss of employment.

Altogether, 4412 men were continuously employed full time throughout the five years after initial screening. Of the 1779 men who were not continuously employed, 337 gave the reason for unemployment or retirement as being wholly or partly due to illness, 923 were unemployed or worked part time for reasons other than illness, and 479 retired for reasons other than illness. The reasons for loss of employment were based on the men's self assessment. Those not employed because of ill health would therefore be heterogeneous in respect of the type and severity of the illnesses experienced.

### CONFOUNDING VARIABLES

*Geographic distribution*—The men's geographic distribution at initial screening was summarised as the percentage living in the north (north of a line from the Bristol Channel to the Wash).

*Social class*—At initial screening social class was determined from each man's longest held occupation and based on the six social classes of the Office of Population Censuses and Surveys.[16] Occupational information was not available for 10 men.

*Cigarette smoking*—Men were classified according to their reported smoking habits at initial screening: never having smoked; currently a non-smoker but used to smoke cigarettes; currently smoking a pipe or cigars and never having smoked cigarettes; currently smoking a pipe or cigar and used to smoke cigarettes; and currently smoking cigarettes. Data were missing for 12 men.

*Alcohol consumption*—Men were classified into five groups on the basis of their estimated average weekly alcohol consumption at initial screening: non-drinkers, occasional drinkers (<1 unit), light drinkers (1-15 units), moderate drinkers (16-42 units), and heavy drinkers (>42 units). A unit was equivalent to half a pint of beer; a single whisky, gin, or brandy; or a glass of wine or sherry (about 8-10 g alcohol). Data were missing for two men.

*Weight*—Body mass index (weight (kg)/(height (m))$^2$) was used as an index of relative weight. Bray's classification of relative weight was used to define men at initial screening as underweight if their body mass index was less than 20 and obese if their index was 30 or more.[2 17] Data were missing for one man.

*Pre-existing disease*—At screening the men were asked whether they had ever been told by a doctor that they had ever had any of 12 major categories of physical disease: angina or heart attck, "other heart trouble," high blood pressure, stroke, diabetes, peptic ulcer, gout, gallbladder disease, thyroid disease, arthritis, bronchitis, and asthma.

### MORTALITY FOLLOW UP

Information on death was collected through the tagging procedures provided by the NHS registers in Southport (for England and Wales) and Edinburgh (for Scotland).[18] Classification into deaths from cardiovascular and non-cardiovascular causes was based on the International Classification of Diseases codes on the death certificates. We included all deaths that occurred up to January 1990, giving an average follow up of 5·5 years after the postal questionnaire (range 4·5-7·0 years).

### HEALTH AT POSTAL QUESTIONNAIRE

In the postal questionnaire the men were asked to classify their current health as excellent, good, fair, or poor. Data were missing for 43 men.

### STATISTICAL ANALYSIS

The relative risk of a man dying compared with a continuously employed man was modelled with Cox's proportional hazard models in SAS.[19]

## Results

Table I provides summary data on the age, social class, geographic status, health status and health related behaviour of the different employment groups at initial screening, when all the men were employed. Compared with the continuously employed men, the men who experienced unemployment or who retired were on average 4·5 years older and were more likely to be manual workers (62% *v* 53%) and to come from the north (73% *v* 68%). They were also more likely to be current cigarette smokers, heavy drinkers, obese, and

TABLE I—*Characteristics of men at initial screening and at postal questionnaire by employment experience in intervening five years*

| Employment status* | Characteristics at initial screening | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean age (years) | No (%) of manual workers | % From north† | % Current smokers‡ | % Heavy drinkers‡ | % Obese‡ | % Recalling ≥2 doctor diagnoses‡ | % In fair or poor health at postal questionnaire‡ |
| Continuously employed (n=4412) | 48·7 | 2284/4284 (53·3) | 67·6 | 44·3 | 8·5 | 7·8 | 23·5 | 15·9 |
| Not continuously employed (n=1779): | 53·1 | 1078/1728 (62·4) | 72·6 | 52·1 | 13·2 | 8·0 | 28·5 | 29·5 |
| Unemployed or retired due to illness (n=377) | 53·5 | 257/364 (70·6) | 80·1 | 59·1 | 16·7 | 9·5 | 41·5 | 70·6 |
| Unemployed not due to illness (n=923) | 50·7 | 599/896 (66·9) | 71·7 | 52·0 | 13·5 | 8·7 | 26·6 | 22·0 |
| Retired not due to illness (n=479) | 57·4 | 222/468 (47·4) | 68·3 | 46·0 | 8·5 | 5·2 | 22·0 | 13·5 |
| Total (n=6191) | 49·9 | 3362/6012 (55·9) | 69·0 | 46·6 | 9·7 | 7·8 | 25·0 | 20·1 |

*Status at questionnaire (see methods for details). †See methods for details. ‡Adjusted for age.

TABLE II—*Deaths and relative risk of death among middle aged men in 5·5 years after postal questionnaire*

| Employment status* | No of deaths | Age adjusted % survival for five years† | Relative risk (95% confidence interval) of death: Adjusted for age | Adjusted for age and town | Adjusted for age, town, and social class | Adjusted for age, town, social class, smoking, and alcohol intake | Adjusted for age, town, social class, smoking, alcohol intake, and pre-existing disease |
|---|---|---|---|---|---|---|---|
| Continuously employed (n=4412) | 174 | 95·7 | 1·00 | 1·00 | 1·00 | 1·00 | 1·00 |
| Not continuously employed (n=1779) | 205 | 91·0 | 2·13 (1·71 to 2·65) | 2·09 (1·68 to 2·60) | 2·06 (1·66 to 2·57) | 2·01 (1·62 to 2·50) | 1·95 (1·57 to 2·43) |
| Unemployed or retired due to illness (n=377) | 78 | 84·3 | 3·94 (2·97 to 5·21) | 3·93 (2·95 to 5·22) | 3·80 (2·86 to 5·06) | 3·42 (2·57 to 4·57) | 3·14 (2·35 to 4·21) |
| Unemployed not due to illness (n=923) | 68 | 93·3 | 1·59 (1·20 to 2·11) | 1·54 (1·16 to 2·05) | 1·50 (1·13 to 2·00) | 1·49 (1·12 to 1·98) | 1·47 (1·10 to 1·96) |
| Retired not due to illness (n=479) | 59 | 92·6 | 1·78 (1·29 to 2·47) | 1·78 (1·28 to 2·48) | 1·83 (1·31 to 2·54) | 1·85 (1·33 to 2·58) | 1·86 (1·34 to 2·59) |

*Status at questionnaire (see methods for details). †Predicted percentage of men aged 60-64 at questionnaire who would not die in next five years.

TABLE III—*Deaths and relative risk of death from cancer or circulatory disease among middle aged men in 5·5 years after postal questionnaire*

| Employment status* | Cancer: No of deaths | Cancer: Relative risk (95% confidence interval) Adjusted for age | Cancer: Relative risk (95% confidence interval) Adjusted for all risk factors† | Circulatory disease: No of deaths | Circulatory disease: Relative risk (95% confidence interval) Adjusted for age | Circulatory disease: Relative risk (95% confidence interval) Adjusted for all risk factors† |
|---|---|---|---|---|---|---|
| Continuously employed (n=4412) | 64 | 1·00 | 1·00 | 87 | 1·00 | 1·00 |
| Not continuously employed (n=1779) | 78 | 2·22 (1·53 to 3·18) | 2·07 (1·45 to 2·97) | 107 | 2·33 (1·72 to 3·16) | 2·13 (1·57 to 2·89) |
| Unemployed or retired due to illness (n=377) | 24 | 3·38 (2·07 to 5·68) | 2·94 (1·77 to 4·88) | 44 | 4·61 (3·14 to 6·75) | 3·49 (2·35 to 5·19) |
| Unemployed not due to illness (n=923) | 27 | 1·74 (1·10 to 2·75) | 1·59 (1·00 to 2·51) | 36 | 1·72 (1·16 to 2·54) | 1·64 (1·10 to 2·43) |
| Retired not due to illness (n=479) | 27 | 2·28 (1·37 to 3·79) | 2·40 (1·44 to 4·01) | 27 | 1·75 (1·08 to 2·81) | 1·81 (1·12 to 2·93) |

*Status at questionnaire (see methods for details). †Age, town, social class, smoking, alcohol intake, and pre-existing disease at initial screening.

to recall at least two doctor diagnoses. However, the men who retired for reasons other than illness differed from the other unemployed or retired men in these characteristics and were more similar to the continuously employed men.

Table I also gives the age adjusted percentages of men stating that their health was fair or poor in the postal questionnaire. This self assessment was after loss of employment had occurred, which might have influenced the response. However, a similar percentage of men who retired for reasons other than illness rated their health as fair or poor as did men who were continuously employed.

### TOTAL MORTALITY

During the 5·5 years of follow up 379 of the men died; of these 174 had been continuously employed throughout follow up and 205 had experienced unemployment or had retired (table II). The men who had experienced unemployment or retired were twice as likely to die as the continuously employed men (relative risk 2·13 after adjustment for age), with the five year age adjusted survival rates being 91% and 96% respectively. Adjustment for the confounding variables measured at screening (before loss of employment) only slightly reduced the relative risk, to 1·95.

The men who had stated that their non-employment was due to ill health had the highest relative risk. They were more than three times as likely to die as the continuously employed men even after adjusting for all the confounding variables measured at screening (relative risk 3·14). The men who were unemployed for reasons other than ill health had an increased risk of mortality (relative risk 1·59): this was reduced by adjustment for the confounding variables but remained significantly raised (relative risk 1·47). Men who retired for reasons other than ill health also had a significantly raised risk of death (relative risk 1·78), which was increased by adjustment for the confounding variables (relative risk 1·86).

### CAUSES OF DEATH

Of the 379 men who died during follow up, 142 died from cancer (43 from lung cancer); 186 from cardiovascular disease (156 from ischaemic heart disease); 19 from respiratory disease; and five from accidents; poisonings, and violence (two suicides). The two suicides occurred among the men who were continuously employed. Only deaths from cancers and from cardiovascular disease were examined in detail (table III). The men who experienced unemployment or who retired had a twofold higher risk of mortality from cancers and cardiovascular diseases compared with the continuously employed men (relative risk 2·22 and 2·33 respectively). Adjustment for the confounding variables reduced these risks to 2·07 and 2·13 respectively, still significantly raised.

Examination of risks by reason for loss of employment gave similar results to that found with total mortality.

### AGE AT SCREENING

The relative risk of all cause mortality by age at the postal questionnaire was 4·0 (95% confidence interval 1·9 to 8·4) at age 45-49, 1·9 (1·1 to 3·3) at age 50-54, 2·4 (1·6 to 3·5) at age 55-59, and 1·9 (1·4 to 2·6) at age 59-64. The overall trend with age was not quite significant (P=0·07). The high risk in the youngest age group was explained by the high risk in men who stated that their unemployment was due to ill health.

TABLE IV—*Relative risk of death from all causes by social class in 5·5 years after postal questionnaire*

| Employment status* | Relative risk (95% confidence interval)†: Manual workers | Relative risk (95% confidence interval)†: Non-manual workers | Difference between relative risk (P value) |
|---|---|---|---|
| Continuously employed (n=4412) | 1·00 | 1·00 | |
| Not continuously employed (n=1779) | 1·74 (1·33 to 2·30) | 2·57 (1·73 to 3·80) | 0·95 |
| Unemployed or retired due to illness (n=377) | 2·74 (1·92 to 3·91) | 5·06 (2·92 to 8·78) | 0·81 |
| Unemployed not due to illness (n=923) | 1·34 (0·95 to 1·91) | 1·79 (1·04 to 3·07) | 0·74 |
| Retired not due to illness (n=479) | 1·57 (1·00 to 2·47) | 2·51 (1·50 to 4·19) | 0·70 |

*Status at questionnaire (see methods for details).
†Adjusted for age, town, smoking, alcohol intake, and pre-existing disease at initial screening.

### OCCUPATION

Table IV shows the relative risks of all cause mortality for men in manual and non-manual occupations. There was no evidence that the relative risk associated with loss of employment was any different for manual and non-manual workers.

## Discussion

In this group of stably employed middle aged men loss of employment (both unemployment and

TABLE V—*Census based studies comparing mortality of men seeking work in first five years after census*

| Study | Group compared | Year of census | Standardised mortality ratio (95% confidence interval) Unadjusted | Adjusted |
|---|---|---|---|---|
| OPCS[6] | All men aged 15-64 | 1971 | 129 (111 to 150) | 121 (103 to 140)† |
| Danish[4] | All men in labour force aged 20-64 | 1970 | 163 (152 to 176) | |
| American[3]: | | | | |
| Part a | All white employed men aged 25-64 | 1979-83 | 155 | |
| Part b | All employed men aged 45-64 | 1979-83 | 122 | 107‡ |
| Finnish[2] | All men employed throughout 1980 aged 30-54 | 1980 | 241 (182 to 205) | 193§ |
| Turin[5] | All men aged 15-59 | 1981 | 202 (179 to 227) | 193‖ |
| Swedish[1]* | All employed men aged 25-64 | 1980-83 | 161 (142 to 184) | |

*Study population was men who had forfeited their entitlement to unemployment benefit because of length of unemployment (10-15 months depending on age).
†Adjusted for social class.
‡Adjusted for income and education.
§Adjusted for socioeconomic status, education, and marital status.
‖Adjusted for housing tenure.

retirement) was associated with an increased risk of mortality even after controlling for a wide range of background variables. We disregarded the official definitions of "unemployed" and "retired" for the following reasons. Changes in the distribution of men by economic activity between the censuses in 1971 and 1981 suggest that at a time of high unemployment non-employed men are more likely to describe themselves as retired or permanently sick whereas in better times they describe themselves as looking for work.[20-22] Moreover, in the 1980s early retirement was often considered to be one of the better ways of dealing with the problem of the rapid rise in unemployment. Official definitions of being employed, unemployed, permanently sick, and retired thus fail to distinguish adequately between unemployment, compulsory early retirement, and voluntary early retirement.

## COMPARISON WITH CENSUS BASED STUDIES

The increased mortality in men who experienced a loss of employment in this study is similar to that reported in census based studies in which data on employment status collected during routine population surveys were linked to death registers (table V).[1-6] It is likely that all the men we classified as unemployed for reasons other than illness and a few of the men classified as unemployed due to illness would be classified officially as unemployed. Also we classified men who had experienced any unemployment during the five year observation period as unemployed. In the reported studies unemployed men are generally those who are unemployed during a particular week (apart from the Finnish longitudinal study[2]). Therefore, the unemployed men in our study would be expected to be more healthy than those in the other studies. Differences in relative mortality between the studies are expected as the experience of unemployment is likely to differ in different countries and at different times.

## CAUSAL ASSOCIATION BETWEEN LOSS OF EMPLOYMENT AND INCREASED MORTALITY?

To be able to interpret the association between increased mortality and loss of employment as causal it is first necessary to allow for any increased risk of mortality due to other reasons. For example, men who experience loss of employment may be less healthy than those who do not. Even if healthy when they lose employment, men who lose employment may have health behaviours that put them at greater risk of developing disease and of dying than men who remain continuously employed. In addition, men who lose employment are more likely to be semiskilled or unskilled manual workers, and the raised risk of mortality may simply reflect the higher overall mortality of these groups. In contrast to most of the census based studies, we were able to take account of a wide range of potential confounding variables in order to adjust for other explanations of the observed increased mortality.

### *Restriction of analysis to stably employed men*

We excluded all men who had experienced any unemployment in the five years before the initial screening to overcome the problem of which came first, ill health or loss of employment. Men who experience one spell of unemployment are certainly at high risk of experiencing another.[11 23 24] If unemployment also has an impact on health then previous employment experience is an important confounding variable.

### *Evidence to support a causal interpretation*

The health measures at screening indicated that, overall, men who lost employment were selected on the basis of poor health, and we hope to investigate this in more detail in a subsequent paper. In order to remove the effect of health selection men who said that their unemployment or retirement was wholly or partly due to ill health could be excluded. However, men who became unemployed or retired for reasons other than illness had a significantly raised risk of dying compared with continuously employed men, which suggests that non-employment even in apparently healthy men was associated with increased mortality.

Table I shows that the men who experienced a loss of employment differed significantly from the continuously employed men in many background variables such as social class, cigarette smoking, and alcohol consumption. However, adjustment for these variables had little effect on relative risk (table II), suggesting that neither health related behaviour nor social factors could adequately explain the differences in mortality. This is strengthened by the fact that similar relative risks were found in non-manual and manual workers (table IV). However, the imprecision of these measurements, taken at only one point in time, may obscure the fact that one or several of them or other unidentified factors might have contributed to the increased risk of death.[25] For this to have occurred, non-employment would have had to have been highly correlated with and reflected the presence of this unknown factor. As the British Regional Heart Study's cohort was a reasonably representative sample of middle aged men in Britain, it is highly unlikely that the non-employment was correlated with a specific factor (such as a particular occupation). Any more general factor that unemployment reflects (such as poverty) would probably be considered a feature of non-employment, and in that sense it could be argued that the observed increased risk of death was attributable to non-employment.

The increased risk of death among men who retired for reasons other than illness further suggests that the effect was causal. These men were very similar to continuously employed men in social class, area of residence, smoking and drinking habits, and in their recall of doctor diagnoses. It seems unlikely that some other factor reflecting general life circumstances caused the increased risk, as these men did not appear to have many life circumstances (apart from non-employment) in common with the other groups of non-employed men. It is possible that, despite being reasonably healthy at screening, these men retired because of a deterioration in their health after screening. However, in the postal questionnaire 13·5% (age adjusted) of them rated their health as fair or poor, similar to the 15·9% (age adjusted) of continuously employed men. This health measure has been shown to be strongly associated with future mortality,[26] and this self assessment was made after the loss of employment had occurred.

The raised mortality in the men who retired for reasons other than illness could not be attributed to

## Public health implications

- Unemployed men are less healthy and have a higher mortality than employed men, but in many studies it is difficult to rule out selection on the basis of ill health and confounding with other background factors such as social class and health behaviours as explanations
- We found that stably employed middle aged men who experienced loss of employment (unemployment or retirement) were twice as likely to die as continuously employed men in a 5·5 year follow up
- Even men who lost employment for reasons unrelated to health were at raised risk of dying after adjustment for factors such as smoking, drinking, and social class, suggesting a causal effect
- Mortality was raised for cancer as well as for cardiovascular disease, however, arguing against a causal effect
- Society should consider the impact of loss of employment on all members of society when they stop working, not just those who are officially classified as unemployed

changes in smoking or drinking habits since the changes in these between screening and the postal questionnaire were identical to the changes occurring among the continuously employed men.[27] In other words, the increased risk among these retired men was unlikely to be due to either health selection or an unmeasured confounding factor. Men who retire for reasons unrelated to health could in theory be divided into those who retire voluntarily and those who are coerced. In practice the distinction is difficult to make, and we have no data on this issue. However, if the raised mortality was specific to the coerced group the relative risk would be higher than for the whole group.

*Evidence against a causal interpretation*

The similarity in the effect of loss of employment on mortality from cancer and cardiovascular diseases might argue against a causal relation. It is plausible that loss of employment might result in suicide[28] or lead to an increased mortality from coronary disease in men who have pre-existing coronary disease.[29] It is less plausible that mortality from cancer would be affected by loss of employment, at least during such a relatively short follow up.[30] There is no indication of a possible cause of the increased risk of mortality from cancer among men whose retirement was not due to illness since it cannot be readily attributed to either cigarette smoking or to occupational exposures.

## CONCLUSION

The observed increased mortality in men experiencing a loss of employment supports the results obtained from other studies. After adjustment for a wide range of background variables including social class, health behaviour, and health status before loss of employment the mortality still remained significantly raised. This suggests a causal effect, but set against this is the non-specific nature of the effect, with the increased mortality involving both cancer and cardiovascular disease. The raised mortality among men who retired for reasons other than illness, particularly in the years close to their retirement, emphasises the need to consider the impact of high levels of unemployment on all members of society when they stop working not just those who are classified as unemployed.

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## ONE HUNDRED YEARS AGO

### PAROCHIAL MEDICAL RELIEF

At an inquest held a few days ago, when a witness had characterised a parochial medical officer as "inhuman" because he declined to prescribe for a child without an order from the relieving officer, Dr. Danford Thomas, coroner for Central Middlesex, made some sensible observations. He stated that the law compelled no parochial doctor to visit or prescribe for a parish patient unless by order. The reason for this was that there must be regular hours for the attendance of relieving officer and surgeon or it would be impossible for the various sick persons to be attended to. If the doctor was liable to be called to a sick poor person whenever any person chose to send to him, often after the patient had been ill for days, he would have no leisure and no rest, which were most essential to his proper attendance on the sick poor who had applied for an order in the usual way. Rules and regulations were essential in the interests of the sick patients as well as of the doctor himself.

(*BMJ* 1894;i:30.)